Digital Blood Pressure Monitor

Automatic Blood Pressure Monitor

6013

Instruction Manual

PLEASE NOTE:
THIS MEDICAL INSTRUMENT MUST BE USED ACCORDING TO INSTRUCTIONS TO ENSURE ACCURATE READINGS.

ADC

6013 Automatic Blood Pressure Monitor

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Optional Accessories:

AC Adapter:	6013ZAC	
Cuff Sizes:		
Adult	850-6013	(9" - 13" / 22.86 - 33.02cm)
Small Adult*	850-6013SA	(7.5" - 9.4" / 19.05 - 23.87cm)
Large Adult	850-6013X	(13" - 17" / 33.02 - 43.18cm)

**Small Adult cuff can only be sold as a replacement part for 6013SA.*

1. INTRODUCTION

1. Introduction

Congratulations on your purchase of the automatic ADC® ADvantage™ Blood Pressure Monitor.

In hospitals and physician's offices throughout the world, where accuracy and dependability are critical, ADC® professional diagnostic products are the instruments of choice.

Now you, too, can enjoy the benefits of ADC® engineering and quality in the home. This feature rich instrument was designed to simplify the measurement of blood pressure and pulse rate at home and deliver consistent, dependable results.

Your ADC® Blood Pressure Monitor is a fully automatic digital blood pressure measuring device for use on the upper arm. It enables very fast and reliable measurement of the systolic and diastolic blood pressure as well as the pulse by way of the oscillometric method. This device offers clinically proven accuracy and has been designed to be user friendly.

Read this booklet thoroughly before attempting to use your new ADC® ADvantage™ Digital Blood Pressure Monitor.

Remember…

- Only a health care professional is qualified to interpret blood pressure measurements. This device is NOT intended to replace regular medical checkups.
- It is recommended that your physician review your procedure for using this device.
- Blood pressure readings obtained by this device should be verified before prescribing or making adjustments to any medications used to control hypertension. Under no circumstances should YOU alter the dosages of any drugs prescribed by your doctor.
- This monitor is intended for use by adults only. Consult with a physician before using this instrument on a child.
- In cases of irregular heartbeat (Arrhythmia), measurements made with this instrument should only be evaluated after consultation with your doctor.
- Familiarize yourself with the section titled "About Blood Pressure". It contains important information on the dynamics of blood pressure readings and will help you to obtain the best results.

NOTE! This device contains sensitive electronic components. Avoid strong electrical or electromagnetic fields in the direct vicinity of the device (e.g. mobile telephones, microwave ovens) during use. These can lead to erratic results.
Do not attempt to service or repair this device yourself. Should a malfunction occur, refer to the back of this booklet for service information.

2. ABOUT BLOOD PRESSURE

2.1 What is Blood Pressure?

Simply put, arterial blood pressure is the force of blood exerted against the walls of the arteries. There are two components to blood pressure - systolic and diastolic pressure. Systolic, the higher pressure, occurs during contraction of the heart. Diastolic, the lower pressure, occurs when the heart is at "rest."

Your level of blood pressure is determined in the circulatory center of the brain and adjusts to a variety of situations through feedback from the nervous system. To adjust blood pressure, the strength and frequency of the heart (Pulse), as well as the width of circulatory blood vessels is altered. Blood vessel width is effected by fine muscles in the blood vessel walls.

Blood pressure is traditionally measured in millimeters of mercury (mmHg). It is recorded as systolic/diastolic. For example a systolic of 120 and diastolic of 80 would be recorded 120/80.

Blood pressure is a dynamic vital sign - one that changes constantly and throughout the day. A person's "resting" blood pressure is the pressure that exists first thing in the morning while a person is still at rest and before consumption of food or drink.

2.2 What is a Normal Blood Pressure?

A systolic pressure of less than 120mmHg and a diastolic pressure of under 80mmHg are recognized as normal by the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, 2003.

Note: Blood pressure does increase with age, so you must check with your doctor to find out what is "normal" for you! Even with normal blood pressure values, a regular self-check with your blood pressure monitor is recommended. You can detect possible changes in your values early and react appropriately. If you are undergoing medical treatment to control your blood pressure, keep a record of values along with time of day and date. Show these values to your doctor. Never use the results of your measurements to independently alter the drug doses prescribed by your doctor.

2.3 What Influences Blood Pressure?

Blood pressure is influenced by many factors including age, weight, physical conditioning, past illness, time of day, altitude, activity, and climate, to name just a few. In general, blood pressure is lower in the morning and increases throughout the day. It is lower in warm weather, and higher in cold weather.

Physical activity can have a significant short term impact on blood pressure. Work, exercise, smoking, eating, drinking - even talking, laughing, or crying will all affect a person's blood pressure.

Your diet, including beverages containing caffeine or alcohol, may affect blood pressure. Emotional stress can have a dramatic impact on your blood pressure.

10. TECHNICAL SPECIFICATIONS

Weight:	2.11 lbs. / 483 g (with batteries)
Size:	3.75" (W) x 6.56" (L) x 8.5" (H) 124mm (W) x 205mm (L) x 81mm (H)
Storage temperature:	–5°C to +50°C (23°F - 122°F)
Humidity:	15% to 85% relative humidity maximum
Operation temperature:	10°C to 40°C (50°F - 104°F)
Display:	LCD (Liquid Crystal Display)
Measuring method:	Oscillometric
Pressure sensor:	Capacitive
Measuring range:	
SYS/DIA:	30 to 280 mmHg
Pulse:	40 to 200 per minute
Cuff pressure display range:	0–299 mmHg
Memory:	Automatically stores the last 14 measurements.
Measuring resolution:	1 mmHg
Accuracy:	Pressure within ± 3 mmHg pulse ± 5 % of the reading
Power source:	a) 4 AA batteries, 1.5 V b) AC adapter 6 V DC 600 mA (voltage 4.5 V DC to 6 V DC)
Special accessories:	Cuff type 850-6013SA, Small Adult (7.5" – 9.4") arm circumference (19.05 - 23.87 cm) Cuff type 850-6013X, Large Adult (13" - 17") arm circumference (33.02-43.18 cm) Cuff type 850-6013, Adult (9" - 13") arm circumference (22.86-33.02 cm)

If fluctuations in readings are larger than 15 mmHg, and/or you hear irregular pulse tones, consult your doctor.

In order to receive market clearance from governmental bodies, this device was subjected to strict clinical tests. The computer program used to measure blood pressure values was tested by experienced cardiac specialists in Germany.

The manufacture of your ADC® ADvantage™ blood pressure monitor is in accordance with the terms of the European standard for blood pressure measuring devices (see Quality Standards) under the supervision of the Technical Monitoring Association Essen (RWTüV-Essen).

Never attempt to repair the instrument yourself!
Any unauthorized opening of the instrument invalidates all warranty claims!

9. QUALITY STANDARDS

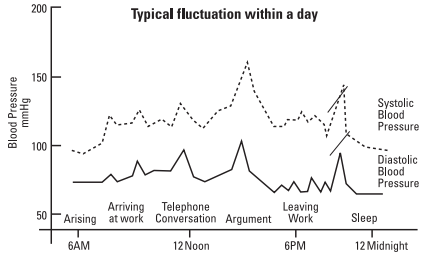
Device standard:	This device is manufactured to meet the European and United States standards for non-invasive blood pressure monitors: EN1060-1 / 1995 EN1060-3 / 1997 DIN 58130 ANSI / AAMI SP10
Electromagnetic compatibility:	Device fulfills the stipulations of the European standard EN 60601-1-2
Clinical testing:	Clinical performance tests were carried out in the U.S. and Germany according to the DIN 58130/1997 procedure N6 (sequential) and AAMI standards (US).

The stipulations of the EU-Guidelines 93/42/EWG for Medical Products Class IIa have been fulfilled.

Even repeated blood pressure measurements taken without adequate rest between readings will alter your blood pressure as the vessels in your arm engorge with blood.
Many of these influences are only temporary or short term, though chronic (long term) exposure to some factors may result in permanently elevated blood pressure levels.

2.4 Does Blood Pressure Vary?

Constantly. An individual's blood pressure varies greatly on a daily and seasonal basis. It changes throughout one's lifetime. It is not uncommon for systolic pressure to vary by 40mmHg or more throughout the course of a single day! While generally not as volatile, diastolic pressure can still vary significantly. In hypertensive individuals, variations are even more pronounced. Normally, blood pressure is at its lowest during sleep and rises in the morning and throughout the day. The chart (right) illustrates the fluctuations that could occur in a typical day.



2.5 What is Hypertension?

Hypertension (high blood pressure) is elevated systolic or diastolic levels. In 90 to 95 percent of the diagnosed cases, the specific causes are unknown, although the condition is often linked with family history, and lifestyle. This is referred to as essential hypertension. In the remaining cases, high blood pressure is a symptom of an underlying, often treatable condition, which if corrected, may normalize blood pressure. This less common type is known as secondary hypertension. Hypertension, if left untreated, may contribute to kidney disease, heart attack, stroke, or other debilitating illnesses.
The following standards for assessment of high blood pressure (without regard to age) have been established by the Joint National Committee, 2003.

Range Classifications	Systolic Blood Pressure	Diastolic Blood Pressure	Precaution Measures
Normal	<120	<80	Monitor regularly
Pre-hypertension	120 - 139	80 - 99	**Contact your physician**
—	**H Y P E R T E N S I O N**		—
Stage 1 *(Moderate)*	140 - 159	90 - 99	**Contact your physician Immediately**
Stage 2 *(Severe)*	160+	100+	**Contact your physician URGENTLY**

(JNC-7 report: Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure / 2003)

Remember only a physician is qualified to interpret the readings obtained from your blood pressure monitor. No attempt should ever be made at self-diagnosis or treatment.

2.6 Can Hypertension be Controlled?

Although essential hypertension cannot be cured, it can usually be controlled by altering lifestyle (including diet), adopting a program of exercise, stress management and, where necessary, with medication under a doctor's supervision.

To help reduce the risk of hypertension, or keep it under control, the American Heart Association (AHA) recommends the following:

- Don't smoke
- Reduce salt and fat intake
- Maintain proper weight
- Exercise regularly
- Have regular physical checkups

2.7 Why Measure Blood Pressure at Home?

Clinical studies have shown improved detection and treatment of hypertension when regular home blood pressure monitoring is done in consultation with a physician.
Blood pressure measured in a doctor's office or hospital setting may cause anxiety and lead to an elevated reading - a condition referred to as "white coat hypertension."
Home measurements generally reduce the "outside" influences on blood pressure readings, and can provide a more comprehensive and meaningful blood pressure history.

Important Note: While it is important to keep an accurate record of your blood pressure measurements, don't be overly concerned by the results of any one measurement. Individual results may be influenced by spiking of your pressure due to diet, anxiety, or mis-measurement resulting from excessive arm movement, or misapplication of the cuff. Many readings taken at the same time each day give a more comprehensive blood pressure history. Always be sure to note the date and time when recording blood pressure and pulse measurements.
For best results, and with time permitting, 3 successive measurements may be taken daily. Make sure to allow at least 5 minute intervals between measurements. Discard any reading that appears suspect and record the average of the remaining readings.

2.8 How is Blood Pressure Measured?

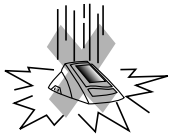
Health care professionals traditionally use a device known as a sphygmomanometer along with a stethoscope - essentially a professional version of the very same instrument you have purchased. The sphygmomanometer is a system consisting of an inflatable bladder contained within a cuff, inflation bulb with air control valve, and pressure measuring manometer (gauge). The gauge may be mechanical or mercurial.

7. CARE AND MAINTENANCE

a) Do not expose the device to extreme temperatures, humidity, dust, or direct sunlight.

b) The cuff contains a sensitive air-tight bladder. Handle this cuff carefully and avoid all types of stress through twisting or buckling.

c) Clean the device with a soft, dry cloth. Do not use gas, thinners, or similar solvents. Spots on the cuff can be removed carefully with a damp cloth and soapsuds. **The cuff must not be washed in a dishwasher, clothes washer, or submerged in water.**



d) Handle the tube carefully. Do not pull on it. Do not allow the tubing to kink and keep it away from sharp edges.

e) Do not drop the monitor or treat it roughly in any way. Avoid strong vibrations.

f) **Never open the monitor!** This invalidates the manufacturer's warranty.

8. WARRANTY

Your ADC® ADvantage™ blood pressure monitor 6013 is **warranted for 5 years** from date of purchase. This warranty includes the instrument and the cuff. The warranty does not apply to damage caused by improper handling, accidents, improper use, or alterations made to the instrument by third parties. There are no user serviceable parts inside. Batteries or damage from old batteries is not covered by the warranty. The warranty is only valid after product is registered online at **www.adctoday.com**.

Note: According to international standards, your monitor should be checked for calibration every 2 years.

☞ **Further information**
Blood pressure is subject to fluctuations even in healthy people.
Comparable measurements always require the same conditions (quiet conditions)!

Err 3	Repeat measurement keeping arm still. If inflation of the cuff takes too long, the cuff is not correctly seated or the tube connection's not tight. Check connections and repeat.
Err 5	The difference between systolic and diastolic is excessive. Measure again carefully following proper cuff procedures and ensure measurement under quiet conditions.

Other possible errors and their solutions

If problems occur when using the device, the following points should be checked:

Malfunction	Remedy
The display remains blank when the instrument is switched on although the batteries are in place.	• Check battery installation. • If the display is unusual, remove the batteries and exchange them for new ones. • Check polarity.
The pressure does not rise although the pump is running.	• Check the connection of the cuff tube and connect properly.
The device frequently fails to measure, or the values measured are too low or high.	• Fit the cuff correctly on the arm. (See Section 5.3) • Before starting measurement make sure that the cuff is not too tight and that clothing is not exerting pressure on the arm. Take articles of clothing off if necessary. • Measure blood pressure again in complete peace and quiet.
Every measurement results in different values, although the device functions normally and normal values are displayed.	• Read the section titled "Common sources of error" (See Section 5.2). Repeat the measurement. • Blood pressure changes constantly. The observed readings may accurately reflect your pressure. • Record daily values and consult your doctor.
Blood pressure values differ from those measured by my doctor.	• Pressure readings in your doctor's office may be higher due to anxiety. • Check cuff connections.
After the instrument has inflated the cuff, the pressure falls very slowly, or not at all. (No reasonable measurement possible).	• Ensure the unit has not been tampered with.

The cuff is wrapped around the limb and inflated to constrict blood flow to the artery. As pressure is released from the cuff through the deflation valve, blood flow returns to the artery producing pulse beats known as Korotkoff sounds, which are detected with the stethoscope. Systolic pressure is recorded at the onset of these sounds. Diastolic pressure is generally recorded when the sounds disappear (when blood flow to the artery returns to normal).

2.9 How should I record my blood pressure?

Record your measurements by setting up a simple chart in a spiral bound notebook as shown below, or use the included record book.

Date	Time	Reading	Pulse
4/24/98	7:50AM	128/83	72
4/25/98	8:00AM	135/77	77
4/26/98	7:45AM	130/75	71
4/27/98	2:00PM	153/89	80

If you like you can add a column for comments about your condition at the time of measurement, or a listing of any factors that may have influenced your readings (such as "had a cold", or "just returned from vacation").

For best results, and with time permitting, 3 successive measurements may be taken daily. Make sure to allow at least 5 minute intervals between measurements. Discard any reading that appears suspect and record the average of the remaining readings. If this method is used, be sure to note that the readings are averaged.

3. COMPONENTS OF YOUR BLOOD PRESSURE MONITOR

The blood pressure monitor is model #6013.

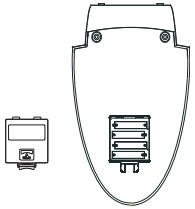
Note: Do not force the cuff connection into the opening. Make sure the cuff connection is not pushed into the AC adapter port. If the cuff is too small, call ADC for further information. A larger cuff is available.

4. SETTING UP YOUR BLOOD PRESSURE MONITOR

4.1 Inserting the batteries

After you have unpacked your device, insert the batteries. The battery compartment is located on the back side of the device (see illustration).

a) Remove cover from the bottom plate, as illustrated.
b) Insert the batteries (4 x size AA). Always use AA long life batteries or alkaline 1.5v batteries. Do not use rechargeable batteries.
c) If a battery warning appears in the display, the batteries are discharged and must be replaced.



Attention!

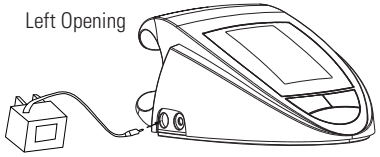
- After the battery warning appears, the device will not operate until the batteries have been replaced.
- If the blood pressure monitor will be left unused for long periods, remove the batteries from the device.

Functional check: Hold the ON/OFF (START) button down to test all the display elements. When functioning correctly all segments must appear.

4.2. Using an AC/DC power adapter (special accessory)

It is possible to operate this blood pressure instrument with an AC/DC adapter. (output 6 V DC / 600 mA with DIN plug). Make certain that you use an adapter which fulfills the legal requirements and electronic requirements in the U.S. (UL standard)

a) Insert the plug into the left socket on the left side of the instrument, as shown in the diagram.
b) Plug the AC adapter into a 110 V power socket (U.S. or Canada).
c) Test that power is available by pressing the ON/OFF button.

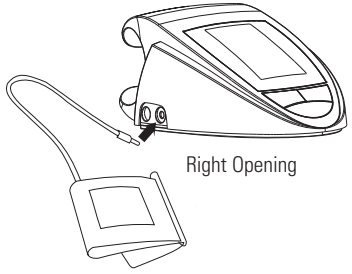


Note:

- No power is taken from the batteries while the AC/DC adapter is connected to the instrument.
- If the power is interrupted during a measurement (e.g. by removal of the adapter from the wall socket), the instrument must be reset by removing the plug from the instrument.
- Consult ADC® if you have questions relating to the AC/DC adapter.

Warning:

- Use only ADC® or ADC® approved adaptors on your blood pressure unit. ADC® is not responsible for damages caused by the use of non-ADC® adaptors. Using a non-ADC® adaptor voids the warranty on your digital blood pressure unit.



4.3. Tube connection

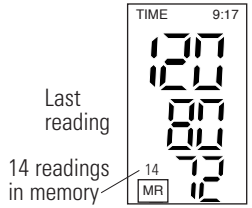
Insert the cuff tube into the right socket on the left side of the instrument, as shown in the diagram.

5.5. Discontinuing a measurement

If it is necessary to interrupt a blood pressure measurement for any reason (e.g the patient feels unwell), the START button can be pressed at any time. The device then immediately lowers the cuff pressure automatically.

5.6. Memory – displaying the last 14 measurements

The measured results are stored in the instrument until a new measurement is carried out or the batteries are removed. With the unit OFF, press and hold the MEMORY button for at least 3-seconds. The screen will show the last reading along with time and date. The MR symbol is displayed in the lower left. Release the button.The last reading will be displayed for 3 more seconds. Each time you press the memory button an earlier measurement will be displayed along with time and date.



☞ **Further information**

Measurements should not occur soon after each other, since the results will be inaccurate. Wait 5 minutes in a relaxed position, sitting or lying down, before you repeat a measurement.

6. ERROR MESSAGES/TROUBLESHOOTING

If an error occurs during a measurement, the measurement is discontinued and a corresponding error code is displayed. (example: Err 1)

Error No.	Possible cause(s) / Solutions
Err 1	The systolic pressure was not determined. The tube may have loosened, or no pulse was detected. *Ensure cuff connections are tight with proper cuff placement. See Section 5.3.
Err 2	Unnatural pressure impulses. The arm was moved during the measurement. Repeat measurement keeping arm still.

4.4. Setting the time and date

This blood pressure monitor incorporates an integrated clock with date display. Time and date are recorded along with pressure and pulse.

You must enter the date and current time. Proceed as follows (Example: Entering 2002-06-15, 09:30 AM):

1. While the unit is OFF, press the DATE/TIME button for at least 3 seconds. The display now indicates the set year, all characters are blinking.
2. The correct year can be entered by pressing the MEMORY button. Each click will change the clock 1 year.
3. Press the DATE/TIME button again. The display now switches to the current date, during which the first character (month) blinks.
   Note: Holding the button down speeds up the procedure.
4. The current month can now be entered by pressing the MEMORY button. (Example: pressing 5 x advances 5 months)
5. Press the DATE/TIME button again. The last two characters (day) are now blinking.
6. The current day can now be entered by pressing the MEMORY button. (Example: 14 x advances the day from the 1st to 15th)
7. Press the DATE/TIME button again. The display now switches to the current time, during which the first character (hour) blinks.
8. The corresponding hour can now be entered by pressing the MEMORY button. (Example: 9 presses advances 9 hours)
9. Press the Date/Time button again. The last two characters (minutes) now blink.
10. The minutes can now be entered by pressing the MEMORY button. (Example: 30 x advances the time from 0 to 30 minutes)

4.5. Reading the set date

After all settings have been made, press the DATE/TIME button once. The date is briefly displayed and then the time. The input is now confirmed and the clock begins to run.

5. THE MEASUREMENT PROCEDURE

Note: You should always be seated or lying down before and during a measurement.

5.1. Before measuring

- Avoid eating and smoking as well as all forms of exertion directly before a measurement. These factors influence the measurement result. Find time to relax by sitting in an armchair or lying down in a quiet atmosphere for about ten minutes before the measurement.
- Remove any garment that fits closely to your upper arm.
- Always measure on the same arm (normally left).
- Always perform measurements at the same time of day, since blood pressure changes during the course of the day.

5.4. Measuring procedure

After the cuff has been appropriately positioned the measurement can begin:

a) Press the START button. 5 beeps will sound and a "0" will blink. The pump begins to inflate the cuff. In the display, the increasing cuff pressure is continually displayed.

Pumping Pressure

b) After automatically reaching an individual pressure, the pump stops and the pressure slowly falls. The cuff pressure is displayed during the measurement.

Measuring

c) When the device has detected your pulse, the heart symbol in the display begins to blink and a beep tone is audible for every pulse beat.

d) When the measurement has been concluded, a long beep tone sounds. The measured systolic and diastolic blood pressure values, as well as the pulse, are now displayed.

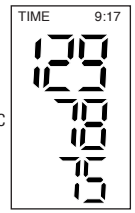
e) The measurement results are displayed until you switch the device off. If no button is pressed for 5 minutes, the device switches off automatically.

Measurement complete

Systolic

Diastolic

Pulse



5.2. Common sources of error:

Note:
Comparable blood pressure measurements always require the same conditions!
These are normally quiet conditions.

- Efforts by the patient to support the arm can increase the blood pressure. Make sure you are in a comfortable, relaxed position and do not activate any muscles in the measurement arm during measurement. Use a cushion for support and rest your arm on a table.

- If the upper arm artery lies considerably lower or higher than the heart, a false higher or lower blood pressure will be measured!
  ***A variation of 6" between cuff and heart level can result in a reading error of + or - 10mmHg.**

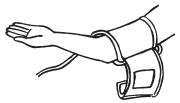
- Cuffs that do not fit properly result in false measurement values. Selecting the correct cuff is extremely important. The cuff size is dependent upon the circumference or distance around your upper arm measured in the center. The permissible range is printed on the cuff. If this is not suitable for your use, contact ADC®.

Note: Use only clinically approved ADC® cuffs. ADC® cuffs are specially manufactured and tested.
- A loose cuff or a sideways protruding air pocket causes false measurement values.
- Repeated measurements without rest allows blood to accumulate in the arm. This can lead to false results. Measurements should be done after a 5 minute rest to ensure accuracy.

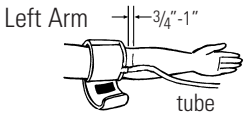
5.3. Fitting the cuff

a) Position the cuff flat on a table with the hook and loop adhesive side down. Pass the end of the cuff through the flat metal ring so that a loop is formed. The hook and loop closure must be facing outward. (Ignore this step if the cuff has already been prepared.)

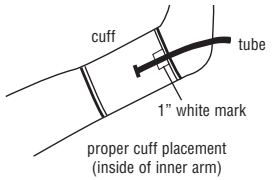
b) Place the cuff over the left upper arm so that the tube is closer to your lower arm.



c) Lay the cuff on the arm as illustrated. Make certain that the lower edge of the cuff lies approximately 3/4" to 1"(2 to 3cm) above the elbow and that the tube is closer to the inner side of the arm.



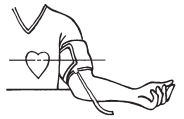
Important! The **1" white mark on the cuff** must lie exactly over the artery which runs down the inner side of the arm.



d) Tighten the cuff by pulling the end and close the cuff by affixing the hook and loop closure.

e) There should be little free space between the arm and the cuff. You should able to fit 2 fingers between your arm and the cuff. Clothing must not restrict the arm. Any piece of clothing which does must be removed.

f) Lay your arm on a table (palm upward) so the cuff is at the same height as your heart. Make sure the tube is not kinked.



g) Remain seated quietly for five minutes before you begin the measurement.

Comment:
If it is not possible to fit the cuff to your left arm, it can also be placed on your right arm. However, all measurements should be made using the same arm.